THE EUCALYPTUS SPECIES OF CAVANILLES

by

A. K. CAMERON.

(Australian Paper Manufacturers Ltd., Matraville, N.S.W.)

Antonio Joseph Cavanilles (1745-1804) was Spain's greatest botanist. He is best remembered for his work in six volumes *Icones et descriptiones plantarum quæ aut sponti in Hispania crescunt.* In this he described for the first time a number of Australian plants and founded the genera *Angophora* and *Bursaria.*

In Volume IV (1797) of that work he describes six species of *Eucalyptus*—three at some length, each with a figure, and three very briefly. While the identities of the first three are clear, and that of a fourth had been accepted without question, that of the other two has been doubtful and none of the suggestions put forward has received general acceptance. Because of the early date of this work, the true identity of all six species is important in working out the synonymy of this complicated genus.

In October 1950 I visited Madrid and inspected the available type specimens used by Cavanilles in describing his eucalypt species and since then have received further information from the Herbarium of the Botanical Gardens there which enables the identity of these species, except in one instance, to be definitely determined.

Little was known of the Australian flora in general, and of the eucalypts in particular, before 1800; so it is important to know the extent of published information on the genus at the time Cavanilles' work was published. Briefly this is as follows:

1788. L'Héritier de Brutelle—*Sertum Anglicum, seu plantæ rariores, quæ in hortis juxta Londinum imprimis in horto regio Kewensis excoluntur.* In this work L'Héritier founded the genus and named the first species *E. obliqua.*

1788. J. Gaertner—*De Fructibus et Seminibus Plantarum.* In this work Gaertner describes and illustrates the fruits of three species but, being unaware of L'Héritier's work, refers them to other genera. They are *Metrosideros gummifera* [= *E. gummifera* (Gaert.) Hochr.], *M. salicifolia,* an indeterminate eucalypt, and *Leptospermum umbellata* [= *E. tereticornis* Sm.].

1790. Dr. J. E. Smith in Surgeon White's book, *Journal of a Voyage to New South Wales,* described *E. resinifera* and *E. piperita.*

1793. Dr. J. E. Smith—*Specimen of the Botany of New Holland,* in which are described *E. capitellata, E. corymbosa* [= *E. gummifera* (Gaert.) Hochr.], *E. robusta* and *E. tereticornis.*

1797. Dr. J. E. Smith—in *Transactions of the Linnean Society,* Volume III, page 286 *et seq,* in which are described *E. botryoides, E. hæmastoma, E. paniculata, E. pilularis* and *E. saligna.* (Note that this work was published a few months earlier than Volume IV of Cavanilles' "*Icones . . . .*" and in the event of synonymy Smith's names take priority.)

L'Héritier's description was based on specimens collected in Tasmania by Nelson and Anderson on Cook's third voyage (1776-79), while Gaertner's are based on specimens collected by Banks and Solander on the famous first voyage.

Smith's descriptions are based on specimens and notes sent to him from Port Jackson after the first settlement of Australia in 1788.

Cavanilles' descriptions are based on specimens collected in the neighbourhood of Port Jackson by Luis Née, botanist on the Spanish expedition led by Malaspina which arrived in Port Jackson in March 1793, remaining there for some time.

It is clear that at the time of writing Volume IV of his *Icones*, Cavanilles was unaware of Smith's work although he had access to Gaertner's "*De Fructibus . . .*" (He mentions this work in his description of *E. platypodos* [= *E. botryoides* Sm.)]. Cavanilles also states that he knew the generic characteristics of *Eucalyptus* as defined by L'Héritier but had not seen "*Sertum Anglicum . . .*", although he had seen Lamarck's *Recueil de Planches de L'Encyclopedie Methodique*. Plate 422 of Lamarck's work is a reproduction to a smaller scale of L'Héritier's illustration of *E. obliqua* with some rearrangement of details.

Up to the time of receiving Née's specimens, then, it is reasonable to assume that Cavanilles had only a general knowledge of the generic characters, had seen one rather crude illustration of a single species and had not handled previously any actual eucalypt specimens. Cavanilles' ignorance of Smith's work is important and must be kept in mind when considering the true identity of his (Cavanilles') *Eucalyptus* species.

The *Eucalyptus* species which Cavanilles describes are *E. corymbosus*, *E. platypodos* and *E. rostratus*, each at some length and with a figure, and briefly *E. obliquus*, *E. salicifolius* and *E. racemosus*. This is the order in which they appear and in which they are now discussed.

E. CORYMBOSUS Cav.

Synonym of *E. gummifera* (Gaert.) Hochr.,
and of *E. corymbosa* Sm.

I have seen the type specimen which is a spray of leaves and blossoms and it is unquestionably the common Bloodwood of New South Wales. I believe it is the merest coincidence that led Cavanilles to select the same specific name already given by Smith, although a very natural one because of the marked difference between the corymbose inflorescence of this species compared with flowering habits of other eucalyptus species known at that time. The accepted synonymy of these species is confirmed.

E. PLATYPODOS Cav.

Synonym of *E. botryoides* Sm.

I have seen the type which is labelled "*Eucalyptus platypodos* Icon. Tab. 341 ex Nova Hollandia". Another sheet in the Madrid Botanical Gardens has this note—"*Eucalyptus botryoides* Smith *Act. Soc. Linn. Lond.* Vol. 3, pag. 286. Willd. *Sp. Pl.* Vol 2, pag. 976. *Eucalyptus platypodos* Cav. *Ic.* Vol. 4, Tab. 341, N.373. Ex oppido Jackson in Nova Hollandia. Née Itex". Both specimens are of leaves and ripe buds and are unquestionably *E. botryoides* Smith. Again the accepted synonymy is confirmed.

E. ROSTRATUS Cav.

Synonym of *E. robusta* Sm.

The synonymy of *E. rostratus* Cav. and *E. robusta* Sm. has long been accepted, although Cavanilles himself at one time considered them to be distinct. Née's notes on his visit to Australia were written up by Cavanilles in an article entitled "Observaciones sobre el suelo, naturales, y planta del Puerto Jackson y Bahia Botanica". (Notes on the soil, natives and plants of Port Jackson and Botany Bay), and published in *Anales de Historia Natural* (Madrid) No. 3, March 1800, pp. 181-245. On page 192 there is this comment by Née on the forests in the vicinity of Parramatta:

> The trees are large, tall and straight, distinct from those resembling melaleuca and seemed to me to form a new genus. From them flows a resinous substance somewhat resembling dragon's blood.

"Dragon's blood" was the commercial description in those days of a resin won from trees growing in the Canary Islands; today it refers to a resin from a Malayan palm. To the above remark Cavanilles adds a footnote:

> L'Héritier came to the same conclusion and named the genus *Eucalyptus*. I have described several species of it in Volume IV of my *Icones*. The tree mentioned by Née is called by the English (settlers) Brown Gum Tree or New Holland Mahogany, and by Smith in his work on New Holland p. 39, Fig. XIII, *Eucalyptus robusta*. This species closely resembles my *E. rostratus* described in *Icones* Vol. IV, pag. 13 and Tab. 342, but is distinguished from it by the shorter leaves, by the shape and direction of the venation which is marked in this, and by having the peduncles plain (?) as noted by White or the author of his Appendix.

The two references here are to Smith's *Specimen of the Botany of New Holland* and White's *Journal of a Voyage to New South Wales*. There is some confusion here, as *E. robusta* is not mentioned in White's *Journal*. The only species mentioned and described in the Appendix to White's *Journal* are *E. piperita* ("The Peppermint Tree") and *E. resinifera* ("The Red Gum Tree"). J. E. Smith is the author of the Appendix. A reference to original copies of Smith's *Specimen of the Botany of New Holland* and White's *Journal* has failed to explain the confusion.

Cavanilles appears to have changed his view later. There are three sheets of specimens in Madrid, all collected by Née, bearing the following comments:

> (1) (The type) "*Eucalyptus rostratus* Icon. Tab. 342. Arbor 15-20 ped. Habitat in tractu ab oppide Jackson ad agros cultar"—in Cavanilles' handwriting.
>
> (2) "*Eucalyptus robusta* Smith Act. Soc. Linn. Lond. Vol. 3, Pag. 283. Smith Nov. Holl. Tab. 13 Willd. Sp. Pl. Vol. 2 P. 2. Pag. 976"—in old handwriting, and also a note in Née's hand "arbor de 15 a 20 p. Teneo deide Jackson a la huerta".

(3) "*Eucalyptus robusta* Smith Nov. Holl. pag. 39, Tab. 13 Willd. Sp. Pl. Vol. 2, P.2, pag. 976. *Eucalyptus rostratus* Cav. Ic. Vol. IV. Tab. 342, N. 374 ex Nova Hollandia. Née Itex"

Sheets 1 and 2 are of leaves and mature buds and are typical of *E. robusta*. Sheet 3 is of leaves and a very immature inflorescence. The leaves in Sheet 3 are typical of those of *E. robusta*. Here again the accepted synonym is confirmed.

E. OBLIQUUS Cav.

Synonym of *E. capitellata* Sm. (?).

Immediately after the description of *E. rostratus* and before that of *E. obliquus* there is a note,

> *Obs.* Præter istas species alias vidi in laudato herbario, non ita perfecte conservatas ut iconibus eas sistam, quas nihilonimus indigitabo brevi descriptione,

which translated reads. "*Note:* Besides these species I saw others in this excellent herbarium not so perfectly preserved that I could have illustrations made of them which nevertheless I will indicate with a brief description."

The brief description of *E. obliquus* is as follows:

> 375. *E. Obliquus.* Eucalyptus folium ovato-lanceolatis. nervo unico ramoso, nervulis ad ipsum raris: umbellis axillaribus
>
> In hac specie folia non videntur coriacea: nervuli adsurgent formantque angulum actum cum nervo principali: umbellæ quinque floræ: et calyptra hemispherica. Videtur eodem species quam D. de Lamark figuravit tab. 422. 11. gen. cuius descriptionem nondum evulgavit.

It has always been presumed that Cavanilles' *E. Obliquus* was merely a redescription of L'Héritier's *E. obliqua*, and Cavanilles' reference to Lamarck's figure has only served to strengthen that view. However, Née's travels did not bring him even close to areas where *E. obliqua* L'Hérit. occurs and it is geographically impossible for the two species to be synonymous.

There are two sheets of specimens in Madrid. The first bears the note, in what is thought to be Née's handwriting, "*E. obliquus* Cav. Icon. pag. De Bahia Botanica." while the second has the note in Née's hand "*Eucalyptus capitellata*" and in Cavanilles' hand "Smith dédit 1803, ex Nova Hollandia. Icon. Planta 1ª post. *Eucalyptus rostratus.* 375 Eucalyptus figuratus in Encyclopedia 1 Tab. 422." The first specimen is in leaf and bud and the second in leaf and blossom. They could be *E. capitellata* Sm. but the evidence is not sufficient for me positively to identify them as such. Further endeavours are being made to establish the true identity of this species as a matter of historical interest, but the true identification cannot affect the eucalypt nomenclature owing to L'Héritier's prior use of the specific name for another plant.

E. SALICIFOLIUS Cavanilles.

Synonym of *E. saligna* Sm.

The brief description is:

> 376. *E. salicifolius*. Eucalyptus foliis lanceolatis. nervo dorsali inæqualiter partis altera parte versus basim breviore.
>
> Hæc species a reliquis distinguitur foliis altera parte versus basim breviori ut in Begonia et aliis plantis: nervuli sunt etiam adscendentes: umbellæ 7—10 floræ axillares.

The true identity of this species has been in doubt for 150 years. Maiden suggested that it might be *E. amygdalina* Labill. and assumed it to be synonymous with *Metrosideros salicifolia* Solander ex Gaertner. It has also been suggested to be *E. scabra* Dum.-Cours. (*E. eugenioides* Sieb.). Blakely took the extreme step of asserting that it was *E. amygdalina* Labill. and suppressed the latter in favour of Cavanilles' species on grounds of priority. Blakely's action involves two untenable hypotheses: (1) that Cavanilles meant his *E. salicifolius* to be the same plant as *Metrosideros salicifolia* Sol. ex Gaert., whereas Cavanilles himself suggested that his *E. platypodos* might coincide with Gaertner's species; (2) that the type of *M. salicifolia* Sol. ex Gaert. came from Tasmania, whereas Botany Bay is the most southerly point it could possibly have been collected by Banks and Solander. The only localities recorded by Banks for *M. salicifolia* are Bay of Islets, Cape Grafton, Endeavour River, Point Lookout and Possession Island.

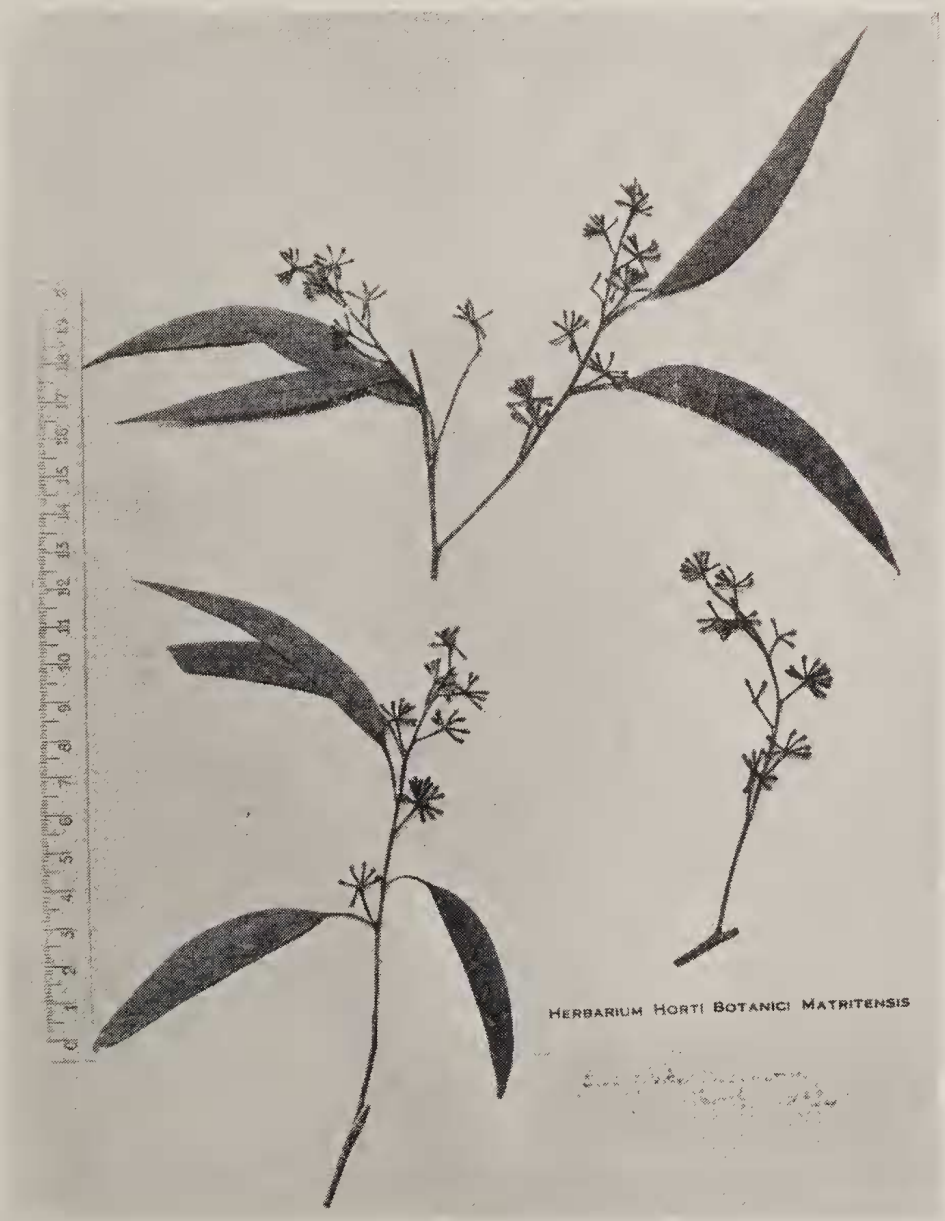
There are two sheets of specimens in Madrid Herbarium: (1) the type bearing the note in Cavanilles' hand "376 *Eucalyptus salicifolia* ex Nova Hollandia. Icon. 2a post *eucalyptum rostratum*." (2) with the note in old handwriting "*Eucalyptus saligna* Smith Act. Soc. Linn. Lond. Vol. 3, pag. 285 Willd. Sp. Pl. Vol. 2, Pt. 2, pag. 977. *Eucalyptus salicifolius* Cav. Ic. Vol. 4, pag. 24, N. 376 ex Nova Hollandia Née Itex". Both sheets are sprays of leaves and buds and I agree with the determination of this species as *E. saligna* Sm. It is a curious coincidence that in a species having no conspicuous resemblance to the willow, Smith should choose a name meaning "willow-like" and Cavanilles "willow-leaved". Some years ago I had pointed out that in the absence of a specimen *E. salicifolius* Cav. must fall on account of uncertainty. Now that authentic material has become available the name must still fall because of synonymy.

E. RACEMOSUS Cav.

Synonym *E. microntha* DC.

There have been the same doubts as to the identity of *E. racemosus* Cav. as have surrounded *E. salicifolius* Cav. Maiden suggested, and Blakely affirmed, that this was *E. crebra* F. Muell., the Narrow-leaved Ironbark. The single specimen in Madrid Herbarium has the note in Née's handwriting, "*Eucalyptus racemosus* Cav. Ic. 4 pa. 24. Née dédit 1801". The sheet has two sprays of leaves and buds and one spray of

PLATE V.



Specimen of *Eucalyptus racemosa* Cav. (syn. *E. micrantha* DC.), collected by Luis Née at Botany Bay, 1793, and preserved in the Herbarium of the Royal Botanical Garden, Madrid.

Photo by Antonio Rodriquez, 1952.

buds alone. In my opinion these are conspecific with *E. micrantha* DC., the Snappy Gum of the Hawkesbury Sandstone. Admittedly it is difficult at times to separate herbarium material of some forms of *E. micrantha* DC. from *E. crebra* F. Muell., but the Cavanilles specimens have leaves typically those of *E. micrantha* DC. and appreciably broader than those of *E. crebra* F. Muell. as found in the vicinity of Port Jackson and, more important, the umbels of Cavanilles' specimens have up to 12 or more flowers (as does *E. micrantha* DC.) whereas those of *E. crebra* F. Muell. are typically 7-flowered, frequently of course less by loss of individual flowers during growth of the inflorescence and not recorded as bearing more than 9 in the umbel. (Mueller's type description says 3–6 flowered).

E. micrantha DC., of course, closely resembles *E. hæmastoma* Sm., but is not so coarse in leaf, bud, flower and fruit as that species. Described as a species by De Candolle, it was regarded by many as synonymous with *E. hæmastoma* Sm., then recognised as a variety of that species, but today usually regarded as sufficiently distinct to be regarded as a separate species.

The belief that *E. racemosus* Cav. is the same species as *E. crebra* F. Muell. largely springs from various identifications of Sieber's No. 476. De Candolle in his *Prodromus* thought it to be *E. hæmastoma* Sm. and quoted *E. racemosus* Cav. as a synonym. Sieber himself named his 476 *E. gracilis* in the sets of plants he distributed under the name "Plantæ Exoticæ de Novæ Hollandiæ", but the name was not published until mentioned by Bentham in Flora Australiensis where he considered it to be *E. crebra* F. Muell.

Another specimen of Sieber's 476 is in Herb. Vindob. with the label "*E. hæmatastoma* Sm., *E. racemosa* Cav. No. 476 Sieber". Possibly the unknown writer of this label had seen Cavanilles' *E. racemosa* in Madrid and had recalled its resemblance to Sieber's No. 476. J. H. Maiden had seen the latter specimen in Vienna and also the Kew specimen which Bentham saw, and says of both that he believes them to be *E. crebra* F. Muell. but goes on to say:

> "At the same time I desire to emphasise the fact that herbarium specimens in mature leaf and half-ripe bud of *E. crebra* are very difficult to discriminate between those of *E. hæmastoma* var. *micrantha*. Indeed I do not attach much importance to Sieber's No. 476. They are incomplete; perhaps they are mixed". [*Crit. Rev. Genus Eucalyptus 2*, pt. 2: 64 (1910)].

The argument for the synonymy of *E. racemosus* Cav. with *E. crebra* F. Muell. is therefore: (1) Bentham's very tentative identification of Sieber's No. 476 as *E. crebra* in *Flora Australiensis 3*: 222 ("To this form — the New England form of *E. crebra* — appear to belong also Sieber's specimens Pl. Exs. No. 476"): (2) De Candolle's statement (*Prodr. Syst. Nat. Veg. 3*: 219) that his interpretation of *E. hæmastoma*, based on specimens of Sieber's No. 476, was the same species as *E. racemosus* Cav. This argument falls down if there is any doubt as to the

identity of Sieber's 476. Maiden himself had doubts and drew attention to the possibility that at least some of this material might be referable to *E. micrantha* D.C. Another instance of the confusion of *E. crebra* with *E. micrantha* occurs in Bentham's *Flora* when he refers specimens collected by C. Stuart in New England to *E. crebra*, whereas Stuart's field note on the bark describes it as "white, separating in thin strips". Maiden's comment on this reference is: "Stuart's bark notes are those of *E. hæmastoma* var. *micrantha* (his specimens have got mixed in some way) and herbarium specimens of the variety and of *E. crebra* are often much alike, unless a complete suite be available". [*Crit. Rev. Gen. Euc.* 2, pt. 2: 66 (1910)]. So twice, and in each case with New England specimens, Maiden gets over a confusion of *E. crebra* and *E. micrantha* by suggesting mixed material. But perhaps both Sieber's 476 and Stuart's specimens *are E. micrantha* (or possibly *E. micrantha* var. *signata* Blak, for De Candolle obviously believed Sieber's No. 476 to be distinct from his No. 497 on which he founded *E. micrantha*). I have dealt with this point at some length to show the weakness in the argument that *E. racemosus* Cav. is *E. crebra* F. Muell.

Since the present article was prepared for press, an interesting note has been published by S. T. Blake in the *Australian Journal of Botany 1*, pt. 2: 306 (1953), viz.:

> "Blakely (*loc. cit.*, pp. 59, 248, 319, etc.) used the name *E. racemosa* Cav. for this species [*E. crebra* F. Muell.]. At Melbourne, there is a small, unlabelled specimen in young bud in a packet marked in Mueller's hand 'E. collectione Cavanillesii dedit Colmeiro' (from the collection of Cavanilles; Colmeiro gave it). This specimen agrees well with Cavanilles' description, and is accepted here as being portion of the type [of *E. racemosa*]. The inflorescence is too immature to allow of certain determination, but the venation of the leaves shows that it belongs to a species quite different from *E. crebra*, but apparently allied to such species as *E. micrantha* DC., *E. radiata* Sieb. or *E. amygdalina* Labill.".

E. racemosus Cav. (or *E. racemosa* as it would be written today using the feminine gender) takes priority over *E. micrantha* DC. as the correct name for the N.S.W. Snappy Gum, so that *E. micrantha* must be dropped and *E. racemosa* Cav. be adopted. *E. crebra* F. Muell. is restored as the correct specific name of the Narrow-leaved Ironbark.

SUMMARY.

E. corymbosus Cav. is synonymous with *E. gummifera* (Gaert.), Hochr. and *E. corymbosa* Sm. As the specific epithet *gummifera* has priority of publication, (as *Metrosideros gummifera* Gaert.), this name stands for the N.S.W. Bloodwood and *E. corymbosus* Cav. falls.

E. platypodos Cav. is synonymous with *E. botryoides* Sm., but the latter enjoys priority of publication and therefore stands for Bangalay and *E. platypodos* Cav. falls.

E. rostratus Cav. is synonymous with *E. robusta* Sm., but the latter enjoys priority of publication and therefore stands for the Swamp Mahogany while *E. rostratus* Cav. falls.

E. obliquus Cav. most probably is synonymous with *E. capitellata* Sm. which, however, has priority of publication and—if the synonymy be proved—will still stand. *E. obliquus* Cav. is *not* synonymous with *E. obliqua* L'Hérit. and must fall owing to preoccupation of the specific epithet by L'Héritier's species.

E. salicifolius Cav. is synonymous with *E. saligna* Sm. and, as the latter was first published, it stands for the Sydney Blue Gum and *E. salicifolius* Cav. falls.

E. racemosus Cav. is conspecific with *E. micrantha* DC. and, as it predates that species by 30 years, it stands as the correct specific name of the Snappy Gum and *E. micrantha* DC. is reduced to the status of a synonym. As a result, *E. crebra* F. Muell. is restored as the correct specific name of the Narrow-leaved Ironbark.

It was unfortunate for Cavanilles that the eucalypts studied by himself and by Smith all came from the same restricted area in the vicinity of Port Jackson and therefore it was inevitable that duplication should occur. It is, however, fitting in view of Cavanilles' pioneer work on the Australian Flora, that at least one of his *Eucalyptus* species should be found to stand.

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